

# **Doping method – properties relations in niobium doped titanium dioxide**

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Niobium doped titanium dioxide has been prepared with various Nb concentrations by two different routes. The first was co-precipitation of titanium and niobium salts in order to create titanium dioxide nanoparticles with a uniform distribution of the dopant within them. The second was incorporation of Nb into already prepared titania, to create a spatial distribution of Nb within the nanoparticle.

A number of methods were used for detailed characterization of the prepared nanopowders. X-ray diffraction was used for crystalline structure determination. Scanning electron microscopy observations were performed for the powder morphology investigation. Differential scanning calorimetry was performed to investigate reversible and irreversible enthalpic transitions during thermal treatments. Dynamic light scattering was used for particle size determination. Electrophoretic light scattering and phase analysis light scattering were performed to investigate the zeta potential in liquid medium. In order to determine the distribution of the dopant (niobium) concentration within a single nanoparticle, Auger electron spectroscopy combined with in-situ ion beam sputtering was performed. Electrical properties were measured using impedance spectroscopy in a wide range of frequency and at different temperatures. The possibility of creation of a core-shell structure in such systems is discussed, considering the experimental results.